



SEQ. ID. NO.:1

GGTATCAGCAAGCCAAACAAAGGCCCCTCATCTAAGCTGTGTTCTTCAGGCCTACCTCCAGCGCCCAGAA TGAGCCTATTGGCCCCCACAGCTCTCAGGAGCAAGAGTGATGTACAGGACATTGTGAGCAAGAAGTGGGT GCTGCAAACTGCATAACCCCCCTCCTACCGGCAAGACACCGAGTGCTCACACAGAGCTTACTCGTAGGAC TTGCCAGCTGGTTAAGACACACCCTGCCATTTTCTCTAACAAGCAGGAGTTCAGTTCAGTTCACAGGGAT TCCCCCTATTTAAGTCCAGCGCTCTGTGCTTTAGTTGATCCCTGGTGTCTCGTGTCTTTTGTCTGCTGCTG TCCCGCCACCAGCCCAGCCATGCAGGACCCTGGGTGCTGCTGCTGCTGGGCCTCAGGCTACAGCTGTC CTGACCCTTCCTCTATTCCCTTGGCCAGTGGAGGAGGAGACCCGGCCTTCTGGAACAAGAAGGCAG CCGAGGCCCTGGATGCTGCCAGGAGCTGCAGCCCATTCAGACATCAGCTAAGAACCTCATCATCTTCCT GGGTGACGGTGAGTGTGAGCGAGGCCTGCCACCCTGGGGCCCTTGTACTCCAAGTACCCAGGGCCACT GGTGGGTACGGACAGGCCTCAGGGTTCAGTCCTGACGAGGTTCTGCTCCTTCAGGAATGGGGGTACCAAC AGTGACAGCCACCAGGATCCTAAAGGGACAGTTGGAAGGTCATCTAGGACCTGAGACACCCCTAGCCATG GACCGCTTCCCATATATGGCTCTGTCCAAGGTGAGTTCTTAGCCACATCTGAAATGACTGATGGGATCCA GGGCAAGGGAGGCAGAGGCTCGGGTGAAGAAATAAATGTCTGCTTTGAGCCCAGTTGGGGTGTCTCTG TCCCCAGACATACAGTGTGGACAGACAGGTTCCAGACAGTGCAAGCACGGCCACCGCCTACCTGTGTGGG GTCAAGACCAACTACAAGACCATCGGCTTGAGTGCAGCCGCGAGATTCGACCAGTGCAACACCACATTTG GCAATGAGGTCTTCTCAGTGATGTACCGTGCCAAGAAAGCAGGTGAGTTGGAGCCAGGCTCAGCTATGGG GGGCAAGCCTAGGGGACTGGATGTCTCACCCTGACCTTTGCCGTCTTCAGGAAAATCCGTAGGTGTGGTG ACCACCACAGAGTGCAGCACGCCTCTCCCTCGGGCACATATGTTCACACAGTGAACCGCAATTGGTATG GGGATGCTGACATGCCTGCGCTGCGGGGAAGGTTGCAAGGACATTGCTACACAACTCATCTCCAA GGGAGGGAGGGGAGGTCAGGGGGGTCAAGGGGGGAAGGGTGGTCCCAGGCAAACCTTGTAGACTGAAC TCCCTGGATCTTCTGGGGTCTTTGAGGGCCGGGTAGTTCAGTTCCCACATACCTGGTGAGGAGCTAGGGA CTTGGTGGGGGGGGAAAATACATGTTTCCTGCTGGAACCCCAGACCCCGAGTATCCAAATGATGCTAATG AGACTGGAACCAGATTGGATGGCAGGAATCTGGTGCAGGAATGGCTGTCAAAGCACCAGGTGACCGACTG CAGAATATTAGTGATACAGTGGAGACCAGGGAAGGGCTTTGAACCTTACCAGTTGCTTATGTCCCTCTAG GGATCCCAGTATGTTTGGAATCGTGAACAACTCATTCAGAAGGCCCAGGATCCGTCAGTGACATACCTCA TGGGTAATGGCCCCACACTTCCTGCACTGGTACACCTCACATGGCAACCACTGATCCTCTGTGTATATAT GTACCGTGACCCCACTGCCAAGCTTGGTGGTCACCAGTATATATTTTTGGTTTTTGTACCTCAGGCCTCTTT GAGCCTGTAGACACAAAATTTGATATTCAACGAGATCCCCTGATGGACCCATCTCTGAAGGATATGACAG AGACGCCGTGAAAGTGCTAAGCAGGAACCCCAAAGGCTTTTATCTCTTTTGTGGAGGGTGAGTCTCCAAG GAGAGGGCCAGCCAGCTCACTAGTGAACGCGACACTCTGACCATAGTCACTGCTGACCACTCCCATGTCT TCTCCTTTGGTGGCTACACACTTCGAGGGACCTCCATCTTCGGTAGGTTCGGGAACAGTGGCAGGCTGTC TGTGGGGATCTAGCAACGACTGAACCACTGGCCAGGCAAAAGGCGGGGGCTCGTCTAAGCATCATTCTTG ACCTCCATCCTGTATGGCAACGGCCCAGGCTATGTCGGTACAGGGGAAAGACCCAACGTCACCGCCGCTG AAAGCAGTGAGTGCGGTGGGGTGGCTTGCCTGAAGGTCGGGTAGAGGTGACTCAGATCAGAGTCCTCTCC CCCACGCGGGGAGGACGTGGCGATATTCGCGCGTGGCCCGCAGGCGCACTTGGTGCACGGGGTGCAGGA GGCGCTGCTGGCCGGAATGCTGATGCTACTACTAGGGGCTCCTGCGGAGTCCTAAACTCCAGCACATCTA GGCTCCACCCACTAGGTCCCACGCCCTCACCTGGTCCTTCCCTTCCCTGACCTCAGTGCTCCCTGCATTC

TCCCTGCGGGCTCTACCCCAGGATCCTCTCTCTCTTTTCTGCTACTGGCCTCATGTCTAGCCCTACCTT GCATTGCAGCTTCCAGGTTCCTCCTACCCAGGCACTCACAAAGGCCAATCACCTCTGAGCTAGCAGCCAG CCTCAGACCCCACAGAGTTACTTCTCCCCAGGCAGCATGACCACCAAGGCCTTGGACCTCCCGGGGCCAAT CCGGACTCTCCTTTTGCCCTCATCCATCAGCCCCTAGAAAAAGATAGGATCCCGCAATAATTTGTGGAGG ACCAAACATGCACCTGCCCATTGGCACTTCCTCCGAGCTTGAATCCATCTTACAGGCTCTGTACCCAGGA CTAAGGCACAAGAGAACACAGAGAGAGGCTGTCTTCCCACTACTCCTCGGTCTAATCTGCTGGCAGGTGG CAAGGCTACGGTGCTGGGTACCCTAGCCAGCCTTTGACATAGTTCTTCCTCGATGTCTCTGGACCAGCTC CACATTCAAAACCATCATGGCTCAGCCATACCAACCCACAGAGCGAAGATTCTGAAATCGTTCAGCCCTT TCATGTCTATTGCCCAGCTAGGAGATTCAAAGAGCTGTACCCCACCCCACTCTCAGGTCATCTCAGGTTG CACCTAAATTTCTGAACTGAGAAAAGTCCCTAACTTCCCAGGTCTGCATTCCCCTGGGGAGAGTCAAGTC TAGTGCCTGCTAGGAACGTGCTCTGCCACTGATCCATAGCCCCCATATCATCTCCTCCCCTCCCCTCTCCT CCTCCCTCTCTCCCTCCTCCTCCTATGACTCTTAGCCCAAGCTGGCCTCAAATTTATGACAGT CCACTTGCTACAGTCTCCCAGATGCTGGATTTTAAGTGTGAGCCACACTCCTAGCATCTTAGTAGGACCT TTGCAGAAGGAAAGCCTGAAGTGTCTGGAGCACTGAGTTCAGATGGGGGAGGGGTAATAGTGGAGCCTCA TGCTAATCCCCCACCCCCAGGCCAGCGATCAGCTGGAAGGTTGCAACGACTGGGTCAGAGAGGGTGGCT GGGACAGAGGATGCAAAGCTGGAGCTGCAAGGAGCTGTGGGAGGAGGAGGAAGAACTTTAAAATCCATGGC AGTGTGGTCACAAGCCTTTGAATAAGAATTCAGGACGTGGTACTTTTTCTATTGCAGGAAATATGCAATC TTTTCCCCTTTTTTCCTGTTTTTTTTTCCATGGGGGGTGGGAATGGGTGTTAGATATAGGAGCTGGTCA GCCAGAGGGGAGATGCAGACCCTAACCATCTCTGACTTGCATTGGAACTTGGTGGAGCACCACCCCAGTA TAGTTCTTGGCCCCTGTCTAACCTGCCCAATGAGGACATTTGAAGGAATTACGTAAAGGTGGATTAAGCT GTGTTTCTCAGTAAGTTTTGCAACACTACAAATTTATCTGTACATTTATGAAGGTACAAAAACACACTTT GCTCCCACTAGTAATATTAGGAAGATTGAATATGCATCCTTATTTGCTAAAATCTTGATTTAACACTGTG AAACATCAATTCGAAATCTTGGCTCTCGGAGTAGTTTATTTCAATTCCGGATTTTAGTGGCTGTCGAGAA AATATGGGAGCTGAATGGAAAAAGGCCATCGTTAACAAAGCTT

## SEQ. ID. NO.:2

$$\label{thm:postern} \begin{align} MQGPWVLLLLGLRLQLSLSVIPVEEENPAFWNKKAAEALDAAKKLQPIQTSAKNLIIFLGDGMGVPTVTAT RILKGQLEGHLGPETPLAMDRFPYMALSKTYSVDRQVPDSASTATAYLCGVKTNYKTIGLSAAARFDQCNT TFGNEVFSVMYRAKKAGKSVGVVTTTRVQHASPSGTYVHTVNRNWYGDADMPASALREGCKDIATQLISNM DINVILGGGRKYMFPAGTPDPEYPNDANETGTRLDGRNLVQEWLSKHQGSQYVWNREQLIQKAQDPSVTYL MGLFEPVDTKFDIQRDPLMDPSLKDMTETAVKVLSRNPKGFYLFVEGGRIDRGHHLGTAYLALTEAVMFDL AIERASQLTSERDTLTIVTADHSHVFSFGGYTLRGTSIFGLAPLNALDGKPYTSILYGNGPGYVGTGERPN VTAAESSGSSYRRQAAVPVKSETHGGEDVAIFARGPQAHLVHGVQEQNYIAHVMASAGCLEPYTDCGLAPP ADESQTTTTTRQTTITTTTTTTTTTTTTTPVHNSARSLGPATAPLALALLAGMLMLLLGAPAES$$

## FIGURE 1B

ALPHOVED OF G A G.

BY CLASS SUBULASS

DRAFTSMAN

<u>Underlined</u> = deleted in targeting construct

**Bold** = sequence flanking Neo insert in targeting construct

AAGCTTAATTGGGGGCCAAGTAGACAGCAGGACATTCAGTGTGCCTTGTTTCCTTTGTCT TTTGGCTCCAGGTATCAGCAAGCCAAACAAAGGCCCCTCATCTAAGCTGTTCTTCAGG CCTACCTCCAGCGCCCAGAATGAGCCTATTGGCCCCCACAGCTCTCAGGAGCAAGAGTGA TGTACAGGACATTGTGAGCAAGAAGTGGGTGCTGCAAACTGCATAACCCCCCTCCTACCG GCAAGACACCGAGTGCTCACACAGAGCTTACTCGTAGGACTTGCCAGCTGGTTAAGACAC CAGGATGGCCACTTTGATCACATGGGAGGGGGGGTGTTGTGCAGTTAGGAACAAAGTC TCCCCCTATTTAAGTCCAGCGCTCTGTGCTTTAGTTGATCCCTGGTGTCTCGTGTCTTTG TCTGCTGCTGTCCCGCCACCAGCCCAGCCATGCAGGGACCCTGGGTGCTGCTGCTGCTG  ${\tt GGCCTCAGGCTACAGCTGTCCCTTAGTGT}\underline{CATTCCAGGTAATGAGGCTCCTTCCAATGAA}$ CACCCCATTCCCACCCATGGACCCTTCATGCTGACCCTTCCTCTGCTATTCCCTTGGCCA GTGGAGGAGAACCCGGCCTTCTGGAACAAGAAGGCAGCCGAGGCCCTGGATGCTGCC **AAGAAGCTGCAGCCCATTCAGACATCAGCTAAGAACCTCATCATCTTCCTGGGTGACGGT** GAGTGTGTGAGCGAGGCCTGCCACCCTGGGGCCCTTGTACTCCAAGTACCCAGGGCCACT GGTGGGTACGGACAGGCCTCAGGGTTCAGTCCTGACGAGGTTCTGCTCCTTCAGGAATGG GGGTACCAACAGTGACAGCCACCAGGATCCTAAAGGGACAGTTGGAAGGTCATCTAGGAC CTGAGACACCCCTAGCCATGGACCGCTTCCCATATATGGCTCTGTCCAAGGTGAGTTCTT **AGCCACATCTGAAATGACTGATGGGATCCAGGGCAAGGGGAGGCAGAGAGGCTCGGGTG**AA GAAATAAATGTCTGCTTTGAGCCCAGTTGGGGTGTCTCTGTCCCCAGACATACAGTGTGG ACAGACAGGTTCCAGACAGTGCAAGCACGGCCACCGCCTACCTGTGTGGGGTCAAGACCA ACTACAAGACCATCGGCTTGAGTGCAGCCGCGAGATTCGACCAGTGCAACACCACATTTG GCAATGAGGTCTTCTCAGTGA'IGTACCGTGCCAAGAAAGCAGGTGAGTTGGAGCCAGGCT CAGCTATGGGGGCAAGCCTAGGGGACTGGATGTCTCACCCTGACCTTTGCCGTCTTCAG GAAAATCCGTAGGTGTGGTGACCACCACCAGAGTGCAGCACGCCTCTCCCTCGGGCACAT GGGAAGGTTGCAAGGACATTGCTACACAACTCATCTCCAACATGGACATTAATGTAAGGA GGGAGGTCAGGGGGTCAAGGGGGGAAGGGGTGGTCCCAGGCAAACCTTGTAGACTGAAC TCCCTGGATCTTCTGGGGTCTTTGAGGGCCGGGTAGTTCAGTTCCCACATACCTGGTGAG CTCTCTGACCACAGGTGATCCTTGGTGGGGGGCGAAAATACATGTTTCCTGCTGGAACCC CAGACCCCGAGTATCCAAATGATGCTAATGAGACTGGAACCAGATTGGATGGCAGGAATC TGGTGCAGGAATGGCTGTCAAAGCACCAGGTGACCGACTGCAGAATATTAGTGATACAGT GGAGACCAGGGAAGGGCTTTGAACCTTACCAGTTGCTTATGTCCCTCTAGGGATCCCAGT ATGTTTGGAATCGTGAACACTCATTCAGAAGGCCCAGGATCCGTCAGTGACATACCTCA TGGGTAATGGCCCCACACTTCCTGCACTGGTACACCTCACATGGCAACCACTGATCCTCT GTGTATATATGTACCGTGACCCCACTGCCAAGCTTGGTGGTCACCAGTATATATTTTGGT TTTGTACCTCAGGCCTCTTTGAGCCTGTAGACACAAAATTTGATATTCAACGAGATCCCC TGATGGACCCATCTCTGAAGGATATGACAGAGACGGCCGTGAAAGTGCTAAGCAGGAACC CCAAAGGCTTTTATCTCTTTGTGGAGGGTGAGTCTCCAAGCTCCCATGGAAAGAGGGGAC AATGGACAGGGACAGGCTCAGTGGCTTCCTGCAGGGGGGCCGAATCGACCGTGGT CACCATCTGGGCACAGCTTATCTGGCGCTGACTGAGGCTGTGATGTTCGACTTAGCCATC GAGAGGGCCAGCCACCTCACTAGTGAACGCGACACTCTGACCATAGTCACTGCTGACCAC TCCCATGTCTCCCTTTGGTGGCTACACACTTCGAGGGACCTCCATCTTCGGTAGGTTC GGGAACAGTGGCAGGCTGTCAATTACGTACAGAATACTTCTGAGCCATCGTTTTCTCTGT CTGTAAAATGGACAGAAATGGCACCTGCCTTGTGGGGGATCTAGCAACGACTGAACCACTG GCCAGGCAAAAGGCGGGGCTCGTCTAAGCATCATTCTTGGCAGGAAAAAGTGTCCCTCT TGTATGGCAACGGCCCAGGCTATGTCGGTACAGGGGAAAGACCCAACGTCACCGCCGCTG AAAGCAGTGAGTGCGGTGGGGTGGCTTGCCTGAAGGTCGGGTAGAGGTGACTCAGATCAG TGTGCCGGTGAAGTCGGAGACCCACGGCGGGGAGGACGTGGCGATATTCGCGCGTGGCCC GCAGGCGCACTTGGTGCACGGGGTGCAGGAGCAGAACTACATCGCGCACGTCATGGCCTC TGCAGGCTGCCTGGAGCCCTACACCGACTGCGGCTTGGCACCCCCTGCAGATGAAAGCCA  GGCGCTGCTGGCCGGAATGCTGATGCTACTACTAGGGGCTCCTGCGGAGTCCTAAACTCC AGCACATCTAGGCTCCACCCACTAGGTCCCACGCCCTCACCTGGTCCTTCCCTTGA TGCTACTGGCCTCATGTCTAGCCCTACCTTGCATTGCAGCTTCCAGGTTCCTCCTACCCA CTTCTCCCCAGGCAGCATGACCACCAAGGCCTTGGACCTCCCGGGGCAATCCGGACTCTC CTTTTGCCCTCATCCATCAGCCCCTAGAAAAAGATAGGATCCCGCAATAATTTGTGGAGG ACCAAACATGCACCTGCCCATTGGCACTTCCTCCGAGCTTGAATCCATCTTACAGGCTCT GTACCCAGGACTAAGGCACAAGAGAACACAGAGAGAGGCTGTCTTCCCACTACTCCTCGG AGTTCTTCCTCGATGTCTCTGGACCAGCTCCACATTCAAAACCATCATGGCTCAGCCATA CCAACCCACAGAGCGAAGATTCTGAAATCGTTCAGCCCTTTCATGTCTATTGCCCAGCTA GGAGATTCAAAGAGCTGTACCCCACCCCACTCTCAGGTCATCTCAGGTTGCACCTAAATT TCTGAACTGAGAAAAGTCCCTAACTTCCCAGGTCTGCATTCCCCTGGGGAGAGTCAAGTC AATAATAAAAGAATGTATTCAATACAATAGCAATAGTCATTTTCTTTTCTTCGGCTCAA AACCAGAGCCTAGTGCCTGCTAGGAACGTGCTCTGCCACTGATCCATAGCCCCCATATCAT CTCCTCCCCTCCCTCCTCCTCCTCTTCTCCTTCCCCCCTCCTCCTATGACTCTGT AGCCCAAGCTGGCCTCAAATTTATGACAGTCCACTTGCTACAGTCTCCCAGATGCTGGAT TTTAAGTGTGAGCCACACTCCTAGCATCTTAGTAGGACCTTTGCAGAAGGAAAGCCTGAA GTGTCTGGAGCACTGAGTTCAGATGGGGGAGGGGTAATAGTGGAGCCTCAGTTGGAGAGA TGCTAATCCCCCACCCCCAGGCCAGCGATCAGCTGGAAGGTTGCAACGACTGGGTCAGA GAGGGTGGCTGGGACAGAGGATGCAAAGCTGGAGCTGCAAGGAGCTGTGGGAGGAGAGGA AGAACTTTAAAATCCATGGCAGTGTGGTCACAAGCCTTTGAATAAGAATTCAGGACGTGG ATGGGGGGTGGGAATGGGTGTTAGATATAGGAGCTGGTCAGCCAGAGGGGAGATGCAGAC CCTAACCATCTCTGACTTGCATTGGAACTTGGTGGAGCACCACCCCAGTATAGTTCTTGG CCCCTGTCTAACCTGCCCAATGAGGACATTTGAAGGAATTACGTAAAGGTGGATTAAGCT GTGTTTCTCAGTAAGTTTTGCAACACTACAAATTTATCTGTACATTTATGAAGGTACAAA AACACACTTTGCTCCCACTAGTAATATTAGGAAGATTGAATATGCATCCTTATTTGCTAA AATCTTGATTTAACACTGTGAAACATCAATTCGAAATCTTGGCTCTCGGAGTAGTTTATT TCAATTCCGGATTTTAGTGGCTGTCGAGAAAATATGGGAGCTGAATGGAAAAAGGCCATC GTTAACAAAGCTT

FIGURE 2B

Gene Sequence Structure \*

Size of genomic: 5293 bp

Targeting Vector\* (genomic sequence)
Construct Number: 2109

Arm Length: 5': 1.1 kb 3': 3.3 kb ----- Targeting Vector

\* Not drawn to scale

(SEQ ID NO: 4)

(SEQ ID NO: 3)

FIGURE 2C